

Application No. 10/581,222  
Attorney Docket No.: 348162-982820  
Appeal Brief

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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/Timothy W. Lohse/  
Timothy W. Lohse

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Applicant	: Bart Gerard Bernard Barenbrug		
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Title: COMPUTER GRAPHICS PROCESSOR AND METHOD FOR RENDERING 3-D  
SCENES ON A 3-D IMAGE DISPLAY SCREEN

**APPEAL BRIEF**

Dear Sir/Madam:

This is a brief for an appeal from a Final Office Action mailed October 5, 2010, and from  
a Notice of Appeal that was filed on January 5, 2011.

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**I. REAL PARTY IN INTEREST**

The real party in interest in this appeal is the assignee of this application, Trident Microsystems Far East.

**II. RELATED APPEALS AND INTERFERENCES**

Appellant is unaware of any related appeals or interferences.

**III. STATUS OF THE CLAIMS**

The application was originally filed with Claims 1-14. Claims 1-13 remain pending and all stand rejected and this is an appeal of rejected Claims 1-13. Claims 1-13 are reproduced and attached in the Claims Appendix.

**IV. STATUS OF AMENDMENTS**

Applicant had submitted a number of responses to non-final and final office actions since the first non-final office action was issued in December 14, 2007. In response to the most recent non-final office action mailed on April 19, 2010, Applicant made amendments to the claims and provided arguments. In response to the Final Office action of October 5, 2010 in which these claims were finally rejected, Applicant submitted a response within 2 months and received an Advisory Action indicating that the claims were not allowed. The claims that appear before the Board are those claims rejected in the Final Office Action and are attached hereto in the Claims Appendix.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

Independent claim 1 recites a computer graphics processor having a renderer for rendering in parallel a plurality of views of 3D images. *See Figures 1 and 2 and pg. 6, line 26 – pg. 12, line 29.* The renderer has a rasterizer configured to traverse a surface grid over a surface of a primitive of a 3D image for all of the plurality of different views of said 3D image such that traversing is performed once for said 3D image. *See Figure 1, Element SS and pg. 7, line 29- pg. 9, line 19.* The renderer also has a shader unit configured to determine a color of the output of the rasterizer and forward a shaded color sample along with its screen coordinates. *See Figure 1, Elements PVS, PPS and pg. 9, line 20 – pg. 10, line 34.* The renderer also has a plurality of screen space resamplers, each of said screen space resamplers being configured to resample the shaded color sample determined by said shader unit according to one of the plurality of different views such that resampling is performed a plurality of times in parallel for said 3D image. *See Figure 1, Element SSR and pg. 10, line 10 – pg. 11, line 12.*

Independent claim 9 recites a method of rendering a plurality of different views of 3D images. *See Figures 1, 2 and 5, pg. 6, line 26 – pg. 12, line 29 and pg. 16, line 29 – pg. 18, line 34.* The method includes traversing a surface grid over a surface of a primitive of a 3D image for all the different plurality of views of said 3D image such that the traversing is performed once for said 3D image. *See Figure 1, Element SS, Figure 5, pg. 7, line 29- pg. 9, line 19 and pg. 16, line 29 – pg. 18, line 34.* The method also includes determining a color of the output of the traversing and forwarding a shaded color sample along with its screen coordinates. *See Figure 1, Elements PVS, PPS, Figure 5, pg.9, line 20 – pg. 10, line 34 and pg. 16, line 29 – pg. 18, line 34.* The method also includes resampling the shaded color sample for each of the N different views such that the resampling is performed a plurality of times in parallel for said 3D image. *See Figure 1, Element SSR, Figure 5, pg. 10, line 10 – pg. 11, line 12 and pg. 16, line 29 – pg. 18, line 34.*

**VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

The grounds of rejection to be reviewed on appeal are as follows:

- 1) The rejection of claims 1-4 and 9-12 under 35 USC 102 as being anticipated by US Patent Publication No. 2002/0109701 to Deering (“Deering”); and
- 2) The rejection of claim 5 under 35 USC 103 as being unpatentable over Deering in view of US Patent Publication No. 2001/0012018 to Hayhurst (“Hayhurst”);
- 3) The rejection of claims 6-7 as being unpatentable over Deering and Hayhurst and further in view of US Patent No. 6,269,175 to Hanna et al. (“Hanna”);
- 4) The rejection of claim 8 as being unpatentable over Deering, Hayhurst and further in view of US Patent Publication No. 20010036307 to Hanna et al. (“Hanna 2”); and
- 5) The rejection of claim 13 as being unpatentable over Deering and Hayhurst.

## **VII. APPELLANT'S ARGUMENT**

### **A. Claim 1-4 and 9-12 Are Not Anticipated by Deering**

The Examiner has rejected claim 1-4 and 9-12 under 35 U.S.C. § 102(b) as being anticipated by US Patent Publication No. 2002/0109701 to Deering ("Deering"). *Final Office action at pages 2-5.*

The Board should overturn this rejection because each claim element is not found, expressly or inherently, in Deering for the reasons set forth below and therefore the anticipation rejection is improper and should be overturned by the examiner.

#### **1. Summary of Deering**

Deering discloses dynamic depth of field emulation system that has a rendering engine that can be used to generate a stereo video image. *See Deering at paragraph 0019.* Deering also discloses that video signals are generated from 3-D graphics data that may be primitives. *See Deering at paragraph 0050.* Deering also discloses a filtering engine 106 that generates video output pixels from samples and that may scan through virtual screen space in raster fashion generating virtual pixel positions and generate a video output pixel at each of the virtual pixel positions. *See Deering at paragraph 0110.*

#### **2. Claim 1**

1. (previously presented) Computer graphics processor having a renderer for rendering in parallel a plurality of views of 3D images, said renderer comprising:

a rasterizer configured to traverse a surface grid over a surface of a primitive of a 3D image for all of the plurality of different views of said 3D image such that traversing is performed once for said 3D image,

a shader unit configured to determine a color of the output of the rasterizer and forward a shaded color sample along with its screen coordinates, and

a plurality of screen space resamplers, each of said screen space resamplers being configured to resample the shaded color sample determined by said shader unit according to one of the plurality of different views such that resampling is performed a plurality of times in parallel for said 3D image.

**(a) Examiner's Rejection of Claim 1**

The Examiner rejected claim 1 under 35 U.S.C. § 102(b) as being anticipated by US Patent Publication No. 2002/0109701 to Deering ("Deering"). *Final Office action at pages 2-3.*

**(b) Legal Standard for an Anticipation Rejection**

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Furthermore, "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). *See also MPEP 2131 et seq.*

**(c) Each Claim Element of Claim 1 is not Found, Expressly or Inherently, In Deering**

Claim 1 recites several claim elements that are not found, expressly or inherently, in Deering and the Board should overturn the examiner's rejection.

**(i) Rasterizer Claim Element**

Claim 1 recites "a rasterizer configured to traverse a surface grid over a surface of a primitive of a 3D image for all of the plurality of different views of said 3D image such that traversing is performed once for said 3D image" which is not found in Deering.

Deering discloses dynamic depth of field emulation system that has a rendering engine that can be used to generate a stereo video image. *See Deering at paragraph 0019.* Deering also discloses that video signals are generated from 3-D graphics data that may be primitives. *See Deering at paragraph 0050.* Deering also discloses a filtering engine 106 that generates video output pixels from samples and that may scan through virtual screen space in raster fashion generating virtual pixel positions and generate a video output pixel at each of the virtual pixel positions. *See Deering at paragraph 0110.*

These disclosures in Deering cannot be interpreted to disclose the claim element. In particular, Deering does not disclose "a rasterizer configured to **traverse a surface grid** over a surface of a primitive of a 3D image **for all of the plurality of different views of said 3D image**

such that **traversing is performed once for said 3D image**” In fact, there is no disclosure at all of this claim element in its entirety which must be disclosed in Deering and the identical invention is not shown in Deering in as complete detail as is contained in the ... claim so that the anticipation rejection of claim 1 based on Deering must be withdrawn for at least this reason.

(A) Response to Final Office Action Arguments

In the final Office action, the examiner argues that “A raster fashion is a rasterization that is applied to a 3D image data, the data could be a stream of many different views of the 3D image through a computational pipeline to be rendered once” because Deering discloses “The rendering engine may send primitives through a computational pipeline (or partition the primitives among a number of parallel pipelines) to render the primitives in terms of samples.” citing to Deering at paragraph 0020. This argument does not change the fact that this claim element is not found, expressly or inherently, in Deering.

The statement “A raster fashion is a rasterization that is applied to a 3D image data, the data could be a stream of many different views of the 3D image through a computational pipeline to be rendered once” is completely unsupported by any evidence or disclosure in a piece of prior art.

Furthermore, it does not make logical sense. While Applicant agrees that in a raster fashion is rasterization, it does not follow that “raster fashion” means rasterization applied to 3D image data nor that the rasterization is to a stream of many different views of the 3D image through a computational pipeline.

In addition, the argument does not meet the anticipation standard. The anticipation standard requires that the claim element is found, expressly or inherently, in Deering. The statement that data “could be a stream of many different views of the 3D image through a computational pipeline” is insufficient to show that this claim element is found in Deering.

(B) Response to Arguments Raised in Advisory Action

The examiner did not raise a new arguments and merely repeated the arguments made in the Final Office action which Application already rebutted above.

Thus, the anticipation rejection of claim 1 based on Deering should be overturned by the Board because this claim element is not found in Deering.

(ii) Shader Claim Element



Claim 1 also recites “a shader unit configured to determine a color of the output of the rasterizer and forward a shaded color sample along with its screen coordinates” which is not found in Deering.

The examiner asserts that the rendering engine in Deering is the claimed shader unit. *See Office action at pg. 3.* However, as shown in Figure 3 of Deering, the rendering engine 102 receives 3D graphics data to render sample data which is stored in the sample buffer 104 and then fed into the filtering engine 106. *See Deering at Figure 3.* The examiner also asserts that the filtering engine 106 is the claimed rasterizer. *See Office action at pg. 3.* Thus, according to the examiner’s interpretation of Deering, the claimed shader unit (the rendering engine of Deering) is feeding samples into the claimed rasterizer (the filtering engine of Deering) which is clearly contrary to the claim language which requires that the shader unit receives the output of the rasterizer. Thus, the claimed shader unit is also not found in Deering and the anticipation rejection of claim 1 based on Deering must be withdrawn for this additional reason.

(A) Response to Final Office Action Arguments

The argument made by the examiner in the Final office action does not change the fact that this claim element is not found, expressly or inherently, in Deering for at least two reasons.

First, the examiner did not respond substantively to the argument in the response. In fact, the examiner still maintains that the renderer unit in Deering is the claimed shader unit (as in the first office action) which means that the examiner’s interpretation of Deering is that the claimed shader unit (the rendering engine of Deering) is feeding samples into the claimed rasterizer (the filtering engine of Deering) which is clearly contrary to the claim language which requires that the shader unit receives the output of the rasterizer.

Second, the examiner’s citations in Deering are not persuasive. Although the samples in Deering can be interpreted as screen coordinates and the rendering engine computes color information (See Deering at 0056 and 0027 cited by the examiner) as argued by the examiner, the fact still remains that the examiner’s interpretation of Deering is that the claimed shader unit (the rendering engine of Deering) is feeding samples into the claimed rasterizer (the filtering engine of Deering) which is clearly contrary to the claim language which requires that the shader unit receives the output of the rasterizer.

(B) Response to Arguments Raised in Advisory Action

The examiner did not raise a new arguments and merely repeated the arguments made in the Final Office action which Application already rebutted above.

Thus, the anticipation rejection of claim 1 based on Deering should be overturned by the Board because this claim element is not found in Deering.

(iii) Plurality of Space Resampler Claim Element

Claim 1 also recites “a plurality of screen space resamplers, each of said screen space resamplers being configured to resample the shaded color sample determined by said shader unit according to one of the plurality of different views such that resampling is performed a plurality of times in parallel for said 3D image” which is not found in Deering. While Deering discloses that supersamples are generated and that a blur value is determined for each sample (supported by the portions of Deering cited by the examiner), Deering does not disclose the plurality of screen space resamplers that resample the shaded color sample from the claimed shader unit (as required by the claim language) nor that the resampling is performed a plurality of times in parallel (as required by the claim language).

In fact, there is no disclosure at all of this claim element in its entirety which must be disclosed in Deering and the identical invention is not shown in Deering in as complete detail as is contained in the ... claim so that the anticipation rejection of claim 1 based on Deering must be withdrawn for at least this reason.

(A) Response to Advisory Action Arguments

In the Advisory action, the examiner asserts that Deering in fact disclosed the claimed plurality of screen space resamplers. While it is true that Deering discloses generally that supersamples are generated (*See Deering at paragraphs 0027 and 0037 cited by the examiner*), the portion cited to by the examiner is the description of Figure 3 which has very limited disclosure. Paragraph 0110 cited by the examiner in the Advisory action discloses that the filtering engine 106 “may access the samples contained in the buffer segment and generate video output pixels from these samples.” *See Deering at paragraph 0110.*

However, the claimed plurality of screen space resamplers that resample the shaded color sample from the claimed shader unit (as required by the claim language) and that sample a plurality of times in parallel (as required by the claim language) are not found in the above portions of Deering, much less any other portions of Deering, so that this claim element is not

found in its entirety in Deering nor is the identical invention shown in Deering in as complete detail as is contained in the ... claim so that the anticipation rejection of claim 1 based on Deering must be withdrawn for at least this reason.

(iv) Summary

In summary, each claim element in its entirety is not found in Deering and the identical invention is not shown in Deering in as complete detail as is contained in the ... claim so that the anticipation rejection of claim 1 based on Deering must be overturned by the Board.

**3. Claims 2-4**

These claims depend from claim 1 and cannot properly be rejected as being anticipated by Deering for at least the same reasons as claim 1.

**4. Claim 9**

9. (previously presented) Method of rendering a plurality of different views of 3D images, comprising the steps of:

traversing a surface grid over a surface of a primitive of a 3D image for all the different plurality of views of said 3D image such that the traversing is performed once for said 3D image,

determining a color of the output of the traversing and forwarding a shaded color sample along with its screen coordinates, and

resampling the shaded color sample for each of the N different views such that the resampling is performed a plurality of times in parallel for said 3D image.

**(a) Examiner's Rejection of Claim 9**

The Examiner rejected claim 9 under 35 U.S.C. § 102(b) as being anticipated by US Patent Publication No. 2002/0109701 to Deering ("Deering"). *Final Office action at pages 2-3.*

**(b) Legal Standard for an Anticipation Rejection**

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Furthermore, "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed.

Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). *See also MPEP 2131 et seq.*

**(c) Each Claim Element of Claim 9 is not Found, Expressly or Inherently, In Deering**

Claim 9 recites several claim elements that are not found in Deering.

**(i) Traversing Surface Grid Claim Element**

Claim 9 recites “traversing a surface grid over a surface of a primitive of a 3D image for all the different plurality of views of said 3D image such that the traversing is performed once for said 3D image” which is not found in Deering.

Deering discloses dynamic depth of field emulation system that has a rendering engine that can be used to generate a stereo video image. *See Deering at paragraph 0019*. Deering also discloses that video signals are generated from 3-D graphics data that may be primitives. *See Deering at paragraph 0050*. Deering also discloses a filtering engine 106 that generate video output pixels from samples and that may scan through virtual screen space in raster fashion generating virtual pixel positions and generate a video output pixel at each of the virtual pixel positions. *See Deering at paragraph 0110*.

These disclosures in Deering cannot be interpreted to disclose the claim element. In particular, Deering does not disclose “**traversing a surface grid** over a surface of a primitive of a 3D image **for all the different plurality of views of said 3D image** such that the **traversing is performed once for said 3D image.**” In fact, there is no disclosure at all of this claim element in its entirety which must be disclosed in Deering and the identical invention is not shown in Deering in as complete detail as is contained in the ... claim so that the anticipation rejection of claim 9 based on Deering must be withdrawn for at least this reason.

**(A) Response to Final Office Action Arguments**

In the final Office action, the examiner argues that “A raster fashion is a rasterization that is applied to a 3D image data, the data could be a stream of many different views of the 3D image through a computational pipeline to be rendered once” because Deering discloses “The rendering engine may send primitives through a computational pipeline (or partition the primitives among a number of parallel pipelines) to render the primitives in terms of samples.”

citing to Deering at paragraph 0020. This argument does not change the fact that this claim element is not found, expressly or inherently, in Deering.

The statement “A raster fashion is a rasterization that is applied to a 3D image data, the data could be a stream of many different views of the 3D image through a computational pipeline to be rendered once” is completely unsupported by any evidence or disclosure in a piece of prior art.

Furthermore, it does not make logical sense. While Applicant agrees that in a raster fashion is rasterization, it does not follow that “raster fashion” means rasterization applied to 3D image data nor that the rasterization is to a stream of many different views of the 3D image through a computational pipeline.

In addition, the argument does not meet the anticipation standard. The anticipation standard requires that the claim element is found, expressly or inherently, in Deering. The statement that data “could be a stream of many different views of the 3D image through a computational pipeline” is insufficient to show that this claim element is found in Deering.

**(B) Response to Arguments Raised in Advisory Action**

The examiner did not raise a new arguments and merely repeated the arguments made in the Final Office action which Application already rebutted above.

Thus, the anticipation rejection of claim 9 based on Deering should be overturned by the Board because this claim element is not found in Deering.

**(ii) Determining A Color Claim Element**

Claim 9 also recites “determining a color of the output of the traversing and forwarding a shaded color sample along with its screen coordinates” which is not found in Deering.

The examiner asserts that the rendering engine in Deering is the claimed shader unit. *See Office action at pg. 3.* However, as shown in Figure 3 of Deering, the rendering engine 102 receives 3D graphics data to render sample data which is stored in the sample buffer 104 and then fed into the filtering engine 106. *See Deering at Figure 3.* The examiner also asserts that the filtering engine 106 is the claimed rasterizer. *See Office action at pg. 3.* Thus, according to the examiner’s interpretation of Deering, the claimed shader unit (the rendering engine of Deering) is feeding samples into the claimed rasterizer (the filtering engine of Deering) which is clearly contrary to the claim language which requires “determining a color of the output of the

traversing and forwarding a shaded color sample along with its screen coordinates.” Thus, the claimed determining process is also not found in Deering and the anticipation rejection of claim 9 based on Deering must be withdrawn for this additional reason.

(A) Response to Final Office Action Arguments

The argument made by the examiner in the Final office action does not change the fact that this claim element is not found, expressly or inherently, in Deering for at least two reasons.

First, the examiner did not respond substantively to the argument in the response. In fact, the examiner still maintains that the renderer unit in Deering is the claimed shader unit (as in the first office action) which means that the examiner’s interpretation of Deering is that the claimed shader unit (the rendering engine of Deering) is feeding samples into the claimed rasterizer (the filtering engine of Deering) which is clearly contrary to the claim language which requires that the shader unit receives the output of the rasterizer.

Second, the examiner’s citations in Deering are not persuasive. Although the samples in Deering can be interpreted as screen coordinates and the rendering engine computes color information (See Deering at 0056 and 0027 cited by the examiner) as argued by the examiner, the fact still remains that the examiner’s interpretation of Deering is that the claimed shader unit (the rendering engine of Deering) is feeding samples into the claimed rasterizer (the filtering engine of Deering) which is clearly contrary to the claim language which requires that the shader unit receives the output of the rasterizer.

(B) Response to Arguments Raised in Advisory Action

The examiner did not raise a new arguments and merely repeated the arguments made in the Final Office action which Application already rebutted above.

Thus, the anticipation rejection of claim 9 based on Deering should be overturned by the Board because this claim element is not found in Deering.

(iii) Resampling Claim Element

Claim 9 also recites “resampling the shaded color sample for each of the N different views such that the resampling is performed a plurality of times in parallel for said 3D image” which is not found in Deering. While Deering discloses that supersamples are generated and that a blur value is determined for each sample (supported by the portions of Deering cited by the examiner), Deering does not disclose resampling the shaded color sample from the claimed

shader unit (as required by the claim language) nor that the resampling is performed a plurality of times in parallel (as required by the claim language).

In fact, there is no disclosure at all of this claim element in its entirety which must be disclosed in Deering and the identical invention is not shown in Deering in as complete detail as is contained in the ... claim so that the anticipation rejection of claim 9 based on Deering must be withdrawn for at least this reason.

(A) Response to Advisory Action Arguments

In the Advisory action, the examiner asserts that Deering in fact disclosed the claimed plurality of screen space resamplers. While it is true that Deering discloses generally that supersamples are generated (*See Deering at paragraphs 0027 and 0037 cited by the examiner*), the portion cited to by the examiner is the description of Figure 3 which has very limited disclosure. Paragraph 0110 cited by the examiner in the Advisory action discloses that the filtering engine 106 “may access the samples contained in the buffer segment and generate video output pixels from these samples.” *See Deering at paragraph 0110.*

However, the claimed plurality of screen space resamplers that resample the shaded color sample from the claimed shader unit (as required by the claim language) and that sample a plurality of times in parallel (as required by the claim language) are not found in the above portions of Deering, much less any other portions of Deering, so that this claim element is not found in its entirety in Deering nor is the identical invention shown in Deering in as complete detail as is contained in the ... claim so that the anticipation rejection of claim 9 based on Deering must be withdrawn for at least this reason.

(iv) Summary

In summary, each claim element in its entirety is not found in Deering and the identical invention is not shown in Deering in as complete detail as is contained in the ... claim so that the anticipation rejection of claim 9 based on Deering must be overturned by the Board.

**5. Claims 10-12**

These claims depend from claim 9 and cannot properly be rejected as being anticipated by Deering for at least the same reasons as claim 9.

**B. Claim 5 Is Not Unpatentable Over Deering in view of Hayhurst**

The examiner rejected claim 5 under 35 USC 103 as being unpatentable over Deering in view of US Patent Publication No. 2001/0012018 to Hayhurst (“Hayhurst”). *See Final Office Action at 5-7.*

The Board should overturn this rejection because the combination of Deering and Hayhurst does not teach or suggest each element of the claim for the reasons set forth below.

**1. Claim 5**

5. (previously presented) Computer graphics processor according to claim 1 or 2, further comprising:

a means for addressing a display screen,

said renderer having an input for a 3D model and an input for at least one viewpoint for rendering image information for supplying to the addressing means,

wherein the renderer further comprises an initial part having an input for the 3-D model and for at least one main view point for rendering objects in the form of at least one main view point Z-stack having stack layers with color information and Z-values,

the renderer further comprising a Z-stack constructor in which, from the at least one main view point Z-stack generated by the initial stage, Z-stacks for additional viewpoints are constructed, and a further image information occlusion semantics stage for generating image information from the z-stacks.

**(a) Legal Standard for an Obviousness Rejection**

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and the prior art reference must teach or suggest all the claim limitations. M.P.E.P. § 2143. Also, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

**(b) The Combination of Deering and Hayhurst Does Not Teach or Suggest Each Element of Claim 5**



Claim 5 is not obvious over Deering and Hayhurst since there are features of claim 5 that are not disclosed or suggested by the combination of Deering and Hayhurst and the obviousness rejection should be overturned by the Board.

**(i) Deering Argument**

This claim depends from claim 1 and thus contains all of the elements of claim 1. Each claim element of claim 1 is not found in Deering for the reasons argued above so that Deering does not disclose each claim element of claim 5 for the same reasons as above.

Furthermore, it is admitted that Deering does not disclose or suggest the elements specifically set forth in claim 5 as the examiner relies on Hayhurst for this disclosure.

**(ii) Hayhurst Argument**

Although Hayhurst does disclose a Z-stack that is a three-dimensional array for storing Z-values of the potential occluders in which each Z-map corresponds to the different depth level of the transparent scene. *See Hayhurst at 0009 - 0012*. However, Hayhurst does not disclose “wherein the renderer further comprises an initial part having an input for the 3-D model and for at least one main view point for **rendering objects in the form of at least one main view point Z-stack having stack layers with color information and Z-values**” nor “the renderer further comprising a **Z-stack constructor in which, from the at least one main view point Z-stack generated by the initial stage, Z-stacks for additional viewpoints are constructed**, and a further image information occlusion semantics stage for generating image information from the z-stacks” as recited in claim 5. Thus, Hayhurst does not disclose or suggest this claim element.

**(iii) Summary**

Since the combination of Deering and Hayhurst does not disclose or suggest each claim element of claim 5 for the reasons above, the Board should overturn the obviousness rejection of claim 5.

**C. Claims 6-7 Are Not Unpatentable Over Deering, Hayhurst and view of Hanna**

The examiner rejected claims 6-7 as being unpatentable over Deering and Hayhurst and further in view of US Patent No. 6,269,175 to Hanna et al. (“Hanna”). *See Final Office Action at 7*.

The Board should overturn this rejection because the combination of Deering and Hayhurst does not teach or suggest each element of the claim for the reasons set forth below.

## 2. Legal Standard for an Obviousness Rejection

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and the prior art reference must teach or suggest all the claim limitations. M.P.E.P. § 2143. Also, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

## 3. The Combination of Deering, Hayhurst and Hanna Does Not Teach or Suggest Each Element of Claims 6-7

Claims 6-7 are not obvious over Deering, Hayhurst and Hanna since there are features of claims 6-7 that are not disclosed or suggested by the combination of Deering, Hayhurst and Hanna and the obviousness rejection should be overturned by the Board.

### (a) Deering Argument

This claim depends from claim 1 and thus contains all of the elements of claim 1. Each claim element of claim 1 is not found in Deering for the reasons argued above so that Deering does not disclose each claim element of claims 6-7 for the same reasons as above.

Furthermore, it is admitted that Deering does not disclose or suggest the elements specifically set forth in claims 6-7 as the examiner relies on Hayhurst for this disclosure.

### (b) Hayhurst Argument

Although Hayhurst does disclose a Z-stack that is a three-dimensional array for storing Z-values of the potential occluders in which each Z-map corresponds to the different depth level of the transparent scene. *See Hayhurst at 0009 - 0012*. However, Hayhurst does not disclose “wherein the renderer further comprises an initial part having an input for the 3-D model and for at least one main view point for **rendering objects in the form of at least one main view point Z-stack having stack layers with color information and Z-values**” nor “the renderer further comprising a **Z-stack constructor in which, from the at least one main view point Z-stack generated by the initial stage, Z-stacks for additional viewpoints are constructed**, and a

further image information occlusion semantics stage for generating image information from the z-stacks” as recited in claim 5. Thus, Hayhurst does not disclose or suggest this claim element.

**(c) Hanna Argument**

Hanna does not cure the disclosure defects of Deering and Hayhurst.

**(d) Summary**

Since the combination of Deering, Hayhurst and Hanna do not disclose or suggest each claim element of claims 6-7 for the reasons above, the Board should overturn the obviousness rejection of claims 6-7.

**D. Claim 8 Is Not Unpatentable Over Deering, Hayhurst and Hanna2**

The examiner rejected claim 8 under 35 USC 103 as being unpatentable over Deering in view of US Patent Publication No. 2001/0012018 to Hayhurst (“Hayhurst”) and further in view of Hanna2. *See Final Office Action at 8.*

The Board should overturn this rejection because the combination of Deering, Hayhurst and Hanna2 do not teach or suggest each element of the claim for the reasons set forth below.

**4. Legal Standard for an Obviousness Rejection**

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and the prior art reference must teach or suggest all the claim limitations. M.P.E.P. § 2143. Also, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

**5. The Combination of Deering, Hayhurst and Hanna Does Not Teach or Suggest Each Element of Claim 8**

Claim 8 is not obvious over Deering, Hayhurst and Hanna2 since there are features of claim 8 that are not disclosed or suggested by the combination of Deering, Hayhurst and Hanna and the obviousness rejection should be overturned by the Board.

**(a) Deering Argument**

This claim depends from claim 1 and thus contains all of the elements of claim 1. Each claim element of claim 1 is not found in Deering for the reasons argued above so that Deering does not disclose each claim element of claim 8 for the same reasons as above.

Furthermore, it is admitted that Deering does not disclose or suggest the elements specifically set forth in claim 8 as the examiner relies on Hayhurst for this disclosure.

**(b) Hayhurst Argument**

Although Hayhurst does disclose a Z-stack that is a three-dimensional array for storing Z-values of the potential occluders in which each Z-map corresponds to the different depth level of the transparent scene. *See Hayhurst at 0009 - 0012*. However, Hayhurst does not disclose “wherein the renderer further comprises an initial part having an input for the 3-D model and for at least one main view point for **rendering objects in the form of at least one main view point Z-stack having stack layers with color information and Z-values**” nor “the renderer further comprising a **Z-stack constructor in which, from the at least one main view point Z-stack generated by the initial stage, Z-stacks for additional viewpoints are constructed**, and a further image information occlusion semantics stage for generating image information from the z-stacks” as recited in claim 8. Thus, Hayhurst does not disclose or suggest this claim element.

**(c) Hanna2 Argument**

Hanna2 does not cure the disclosure defects of Deering and Hayhurst.

**(d) Summary**

Since the combination of Deering, Hayhurst and Hanna2 do not disclose or suggest each claim element of claim 8 for the reasons above, the Board should overturn the obviousness rejection of claims 8.

**E. Claim 13 Is Not Unpatentable Over Deering and Hayhurst**

The examiner rejected claim 13 under 35 USC 103 as being unpatentable over Deering in view of US Patent Publication No. 2001/0012018 to Hayhurst (“Hayhurst”). *See Final Office Action at 9-10*.

The Board should overturn this rejection because the combination of Deering, Hayhurst and Hanna2 do not teach or suggest each element of the claim for the reasons set forth below.

**1. Legal Standard for an Obviousness Rejection**

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and the prior art reference must teach or suggest all the claim limitations. M.P.E.P. § 2143. Also, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

**2. The Combination of Deering and Hayhurst Do Not Teach or Suggest Each Element of Claim 13**

Claim 13 is not obvious over Deering, Hayhurst and Hanna2 since there are features of claim 13 that are not disclosed or suggested by the combination of Deering and Hayhurst and the obviousness rejection should be overturned by the Board.

**(a) Deering Argument**

This claim depends from claim 9 and thus contains all of the elements of claim 9. Each claim element of claim 9 is not found in Deering for the reasons argued above so that Deering does not disclose each claim element of claim 13 for the same reasons as above.

Furthermore, it is admitted that Deering does not disclose or suggest the elements specifically set forth in claim 13 as the examiner relies on Hayhurst for this disclosure.

**(b) Hayhurst Argument**

Although Hayhurst does disclose a Z-stack that is a three-dimensional array for storing Z-values of the potential occluders in which each Z-map corresponds to the different depth level of the transparent scene. *See Hayhurst at 0009 - 0012*. However, Hayhurst does not disclose “wherein the renderer further comprises an initial part having an input for the 3-D model and for at least one main view point for **rendering objects in the form of at least one main view point Z-stack having stack layers with color information and Z-values**” nor “the renderer further comprising a **Z-stack constructor in which, from the at least one main view point Z-stack generated by the initial stage, Z-stacks for additional viewpoints are constructed**, and a further image information occlusion semantics stage for generating image information from the z-stacks” as recited in claim 13. Thus, Hayhurst does not disclose or suggest this claim element.

**(c) Summary**

Since the combination of Deering and Hayhurst do not disclose or suggest each claim element of claim 13 for the reasons above, the Board should overturn the obviousness rejection of claims 13.

**F. Conclusion**

In view of the foregoing arguments, claims 1-12 are patentable over Deering and the combination of Deering and Hayhurst, Hanna or Hanna2 for the reasons set forth above and the rejection must be rejected and the claims allowed.

Respectfully submitted,

**DLA Piper US LLP**

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By: /Timothy W. Lohse/  
Timothy W. Lohse  
Reg. No. 35,255  
Attorneys for Applicant

ATTN: Patent Department  
DLA Piper LLP (US)  
2000 University Avenue  
East Palo Alto, CA 94303-2248  
Email: [timothy.lohse@dlapiper.com](mailto:timothy.lohse@dlapiper.com)  
Tel: (650) 833-2055  
Fax: (650) 833-2001

## CLAIMS APPENDIX

1. (previously presented) Computer graphics processor having a renderer for rendering in parallel a plurality of views of 3D images, said renderer comprising:

a rasterizer configured to traverse a surface grid over a surface of a primitive of a 3D image for all of the plurality of different views of said 3D image such that traversing is performed once for said 3D image,

a shader unit configured to determine a color of the output of the rasterizer and forward a shaded color sample along with its screen coordinates, and

a plurality of screen space resamplers, each of said screen space resamplers being configured to resample the shaded color sample determined by said shader unit according to one of the plurality of different views such that resampling is performed a plurality of times in parallel for said 3D image.

2. (previously presented) Computer graphics processor according to claim 1, further comprising:

a texture memory for storing texture maps,

wherein said surface grid is derived from a texture map being associated with said primitive and being stored in said texture memory.

3. (previously presented) Computer graphics processor according to claim 2, wherein a grid associated to one of the texture maps stored in the texture memory is chosen as said surface grid, if three requirements are fulfilled, said three requirements including:

said texture map is addressed independently,

said texture map is based on a 2D texture, and

the texture coordinates at the vertices do not make up a degenerate primitive.

4. (previously presented) Computer graphics processor according to claim 3, wherein the texture map with the largest area in texture space is chosen, if more than one texture maps stored in said texture memory fulfill said three requirements.

5. (previously presented) Computer graphics processor according to claim 1 or 2, further comprising:

a means for addressing a display screen,

said renderer having an input for a 3D model and an input for at

least one viewpoint for rendering image information for supplying to the addressing means,

wherein the renderer further comprises an initial part having an input for the 3-D model and for at least one main view point for rendering objects in the form of at least one main view point Z-stack having stack layers with color information and Z-values,

the renderer further comprising a Z-stack constructor in which, from the at least one main view point Z-stack generated by the initial stage, Z-stacks for additional viewpoints are constructed, and a further image information occlusion semantics stage for generating image information from the z-stacks.

6. (previously presented) Computer graphics processor according to claim 5, wherein said renderer further comprises an object extractor for extraction of objects from a view point zstack.

7. (previously presented) Computer graphics processor according to claim 6, wherein the object extractor is arranged for extracting objects from the at least one main view point z-stack.

8. (previously presented) Computer graphics processor according to claim 5, wherein the renderer comprises a DOF rendering stage wherein the DOF rendering stage is arranged for DOF processing of the at least one main view point z-stack into at least one main view point zstack comprising DOF blurring.

9. (previously presented) Method of rendering a plurality of different views of 3D images, comprising the steps of:

traversing a surface grid over a surface of a primitive of a 3D image for all the different plurality of views of said 3D image such that the traversing is performed once for said 3D image,

determining a color of the output of the traversing and forwarding a shaded color sample along with its screen coordinates, and



resampling the shaded color sample for each of the N different views such that the resampling is performed a plurality of times in parallel for said 3D image.

10. (previously presented) The method of rendering a plurality of views of 3D images according to claim 9, further comprising the steps of:

storing texture maps in a texture memory wherein said surface grid is derived from a texture map being associated with said primitive and being stored in said texture memory.

11. (previously presented) The method of rendering a plurality of views of 3D images according to claim 10, wherein a grid associated to one of the texture maps stored in the texture memory is chosen as surface grid, if three requirements are fulfilled, said three requirements including:

said texture map is addressed independently,

said texture map is based on a 2D texture, and

the texture coordinates at the vertices do not make up a degenerate primitive.

12. (previously presented) The method of rendering a plurality of views of 3D images according to claim 11, wherein the texture map with the largest area in texture space is chosen, if more than one texture maps stored in said texture memory fulfill said three requirements.

13. (previously presented) The method of rendering a plurality of views of 3D images according to claim 11, further comprising the steps of:

supplying data and addressing means of a 3D display device wherein for a main view point objects in the form of at least one main view point Z-stack comprising stack layers are rendered with RGB and Z-values, and

constructing from the at least one main view point Z-stack z-stacks for additional viewpoints, and

generating from the Z-stacks for additional viewpoints by means of Z-tracing data to be supplied to the addressing means.

14. Cancelled.

**EVIDENCE APPENDIX**

NONE

**RELATED PROCEEDINGS APPENDIX**

NONE